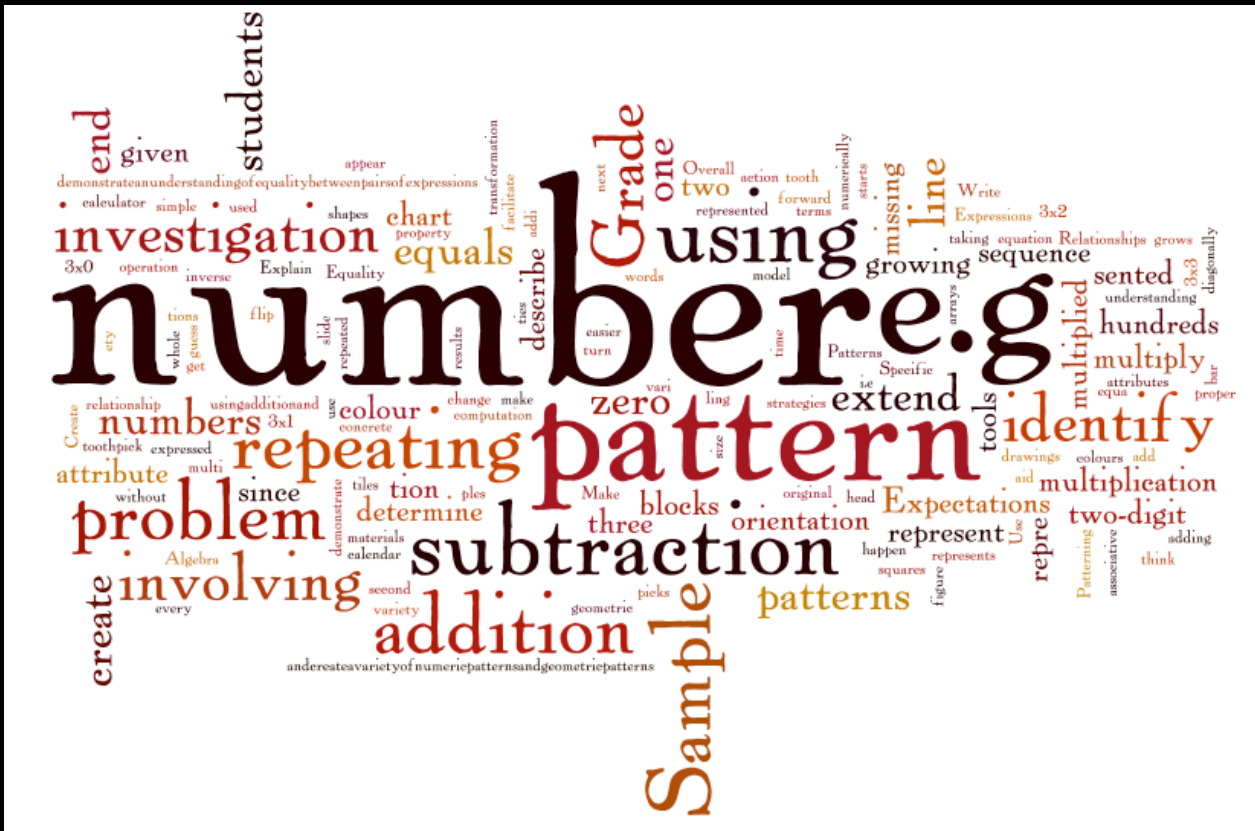


Consolidation of Grade 3 EQAO Questions



Patterning & Algebra

Compiled by Devika William-Yu (SE2 Math Coach)

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectations

PV1	<ul style="list-style-type: none"> describe, extend, and create a variety of numeric patterns and geometric patterns
PV2	<ul style="list-style-type: none"> demonstrate an understanding of equality between pairs of expressions, using addition and subtraction of one- and two-digit numbers

Year	PV1	PV2
Spring 2006	MC6 MC21 MC26 OR8	MC7 MC16 MC22
Spring 2007	MC19 MC35 MC36 OR28	MC1 MC6 MC18
Spring 2008	MC5 MC13 MC19 OR7	MC3 MC4 MC20
Spring 2009	MC5 MC19 OR7	MC3 MC12 MC20 MC33
Spring 2010	MC2 MC18 MC32 OR27	MC5 MC11 MC19
Spring 2011	MC1 MC13 MC17 MC19 MC35 OR28	MC12

Year	Knowledge & Understanding	Problem Solving (Thinking)	Application
Spring 2009	MC12 MC19	MC33	MC3 MC5 MC20 OR7
Spring 2010	MC2 MC11 MC18	MC32	MC5 MC19 OR27
Spring 2011	MC12 MC13 MC19	MC17	MC1 MC35 OR28

PATTERNING & ALGEBRA: Patterns and Relationships

Grade 2	Grade 3	Grade 4
Overall Expectation		
- identify, describe, extend, and create repeating patterns, growing patterns, and shrinking patterns	- describe, extend, and create a variety of numeric patterns and geometric patterns	- describe, extend, and create a variety of numeric and geometric patterns, make predictions related to the patterns, and investigate repeating patterns involving reflections
Specific Expectations		
– create a repeating pattern by combining two attributes	- identify, extend, and create a repeating pattern involving two attributes, using a variety of tools	
- demonstrate, through investigation, an understanding that a pattern results from repeating an operation or making a repeated change to an attribute	- demonstrate, through investigation, an understanding that a pattern results from repeating an action, repeating an operation, using a transformation, or making some other repeated change to an attribute	
– represent a given growing or shrinking pattern in a variety of ways	- create a number pattern involving addition or subtraction, given a pattern represented on a number line or a pattern rule expressed in words	- create a number pattern involving addition, subtraction, or multiplication, given a pattern rule expressed in words
- identify and describe, through investigation, growing patterns and shrinking patterns generated by the repeated addition or subtraction of 1's, 2's, 5's, 10's, and 25's on a number line and on a hundreds chart	- identify and describe, through investigation, number patterns involving addition, subtraction, and multiplication, represented on a number line, on a calendar, and on a hundreds chart	
– identify, describe, and create, through investigation, growing patterns and shrinking patterns involving addition and subtraction, with and without the use of calculators		
– create growing or shrinking patterns	- extend repeating, growing, and shrinking number patterns	- extend, describe, and create repeating, growing, and shrinking number patterns
– identify repeating, growing, and shrinking patterns found in real-life contexts		- connect each term in a growing or shrinking pattern with its term number, and record the patterns in a table of values that shows the term number and the term
	- represent simple geometric patterns using a number sequence, a number line, or a bar graph	- make predictions related to repeating geometric and numeric patterns
		- extend and create repeating patterns that result from reflections, through investigation using a variety of tools

PATTERNING & ALGEBRA: Expressions and Equality

Grade 2	Grade 3	Grade 4
Overall Expectations		
- demonstrate an understanding of the concept of equality between pairs of expressions, using concrete materials, symbols, and addition and subtraction to 18	- demonstrate an understanding of equality between pairs of expressions, using addition and subtraction of one- and two-digit numbers	- demonstrate an understanding of equality between pairs of expressions, using addition, subtraction, and multiplication
Specific Expectations		
- demonstrate an understanding of the concept of equality by partitioning whole numbers to 18 in a variety of ways, using concrete materials		
– represent, through investigation with concrete materials and pictures, two number expressions that are equal, using the equal sign	- determine, through investigation, the inverse relationship between addition and subtraction	- determine, through investigation, the inverse relationship between multiplication and division
– identify, through investigation, and use the commutative property of addition to facilitate computation with whole numbers	- identify, through investigation, and use the associative property of addition to facilitate computation with whole numbers	- identify, through investigation and use the commutative property of multiplication to facilitate computation with whole numbers
		- identify, through investigation , and use the distributive property of multiplication over addition to facilitate computation with whole numbers
– identify, through investigation, the properties of zero in addition and subtraction (i.e., when you add zero to a number, the number does not change; when you subtract zero from a number, the number does not change)	- identify, through investigation, the properties of zero and one in multiplication (i.e., any number multiplied by zero equals zero; any number multiplied by 1 equals the original number)	
– determine the missing number in equations involving addition and subtraction to 18, using a variety of tools and strategies	- determine, the missing number in equations involving addition and subtraction of one- and two-digit numbers, using a variety of tools and strategies	- determine the missing number in equations involving multiplication of one- and two-digit numbers, using a variety of tools and strategies

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2006

- 6** Kevin is making a number pattern by repeating the first three numbers he writes in the same order.

Which of the following could be Kevin's pattern?

- ☐ 2, 4, 6, 2, 4, 6, 2, ... *
- ☐ 2, 4, 6, 8, 10, 12, 14, ...
- ☐ 2, 4, 2, 4, 2, 4, 2, ...
- ☐ 2, 2, 4, 4, 6, 6, 2, ...

- 26** Beverly counts by 2s to mark points on the number line shown.



Which two numbers before 25 should Beverly mark with points?

- ☐ 21 and 22
- ☐ 21 and 23 *
- ☐ 22 and 24
- ☐ 23 and 24

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2006

- 21** Nalini is using the rule “add 4” to shade numbers on the hundreds chart shown. She starts her pattern with the number 3.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The pattern continues in the same way. What number will Nalini shade on the chart next?

- ☐ 45
- ☐ 47 *
- ☐ 49
- ☐ 51

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2006

- 8** Chitra makes the following number pattern using a rule. The pattern continues in the same way.

5, 9, 13, 17, 21, 25, 29, . . .

Use the list below to create another number pattern.

- Use Chitra's pattern rule.
- Start with the number 6.
- Include 5 more numbers in your pattern.

Describe the rule Chitra used to make her pattern.

My number pattern is 6, _____, _____, _____, _____, _____.

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2007

- 19** The picture below shows figures Jen forms using pencils. She begins with Figure 1 and continues until she finishes Figure 5.



Figure 1

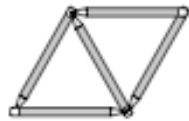


Figure 2

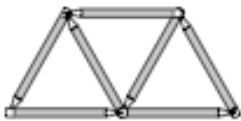


Figure 3

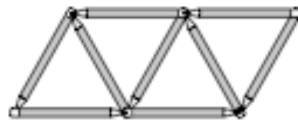


Figure 4

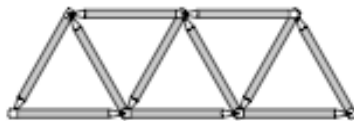


Figure 5

Which sequence below represents the number of pencils Jen uses for each figure in the picture?

- ☐ 1, 2, 3, 4, 5
- ☐ 3, 5, 7, 9, 11
- ☐ 3, 6, 9, 12, 15
- ☐ 5, 4, 3, 2, 1

- 35** Kim is making a pattern using a triangle shape, as shown below.



Which two attributes does Kim change to make this pattern?

- ☐ size and direction
- ☐ number and colour
- ☐ size and shape
- ☐ direction and number

- 36** The following number pattern shows how the number of magnets in Sabrina's collection has increased over a four-month period.

4, 10, 16, 22, . . .

The number of magnets continues to increase by 6 each month. What will be the total number of magnets in Sabrina's collection next month?

- ☐ 6
- ☐ 14
- ☐ 28
- ☐ 29

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2007

- 23** Mrs. Anton is buying packages of pencils for her class. A store advertises that every shopper will receive 1 free package of pencils for every 2 packages purchased.

Packages of Pencils

Number Purchased	Packages of Free Packages
2	1
3	1
4	2

Based on the pattern shown in the chart, what is the least number of packages of pencils Mrs. Anton must purchase to receive 5 free packages?

Justify your answer.

Mrs. Anton must purchase at least _____ packages of pencils to receive 5 free packages.

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2008

- 5** Mari is using a rule to make the number pattern shown below.

567, 571, 575, 579, . . .

Which of the following patterns could use the same rule?

- ☐ 892, 888, 884, 880
- ☐ 893, 897, 903, 904
- ☐ 894, 898, 902, 906
- ☐ 895, 900, 905, 910

- 19** A repeating geometric pattern is shown below.

•▲□|•▲□|•▲□|•_____

Which of the following completes the pattern?

- ☐ •▲□|
- ☐ ▲□|•
- ☐ □▲•|
- ☐ |▲•□

- 13** Starting on July 2nd, Tim washes dishes every 4th day in July. He shades the dates he washes dishes on the calendar.

Which calendar shows the dates shaded correctly?

☐

July						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

☐

July						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

☐

July						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

☐

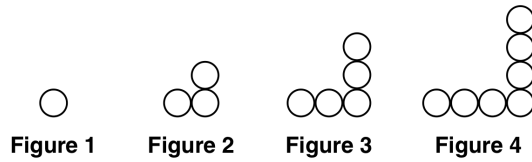
July						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

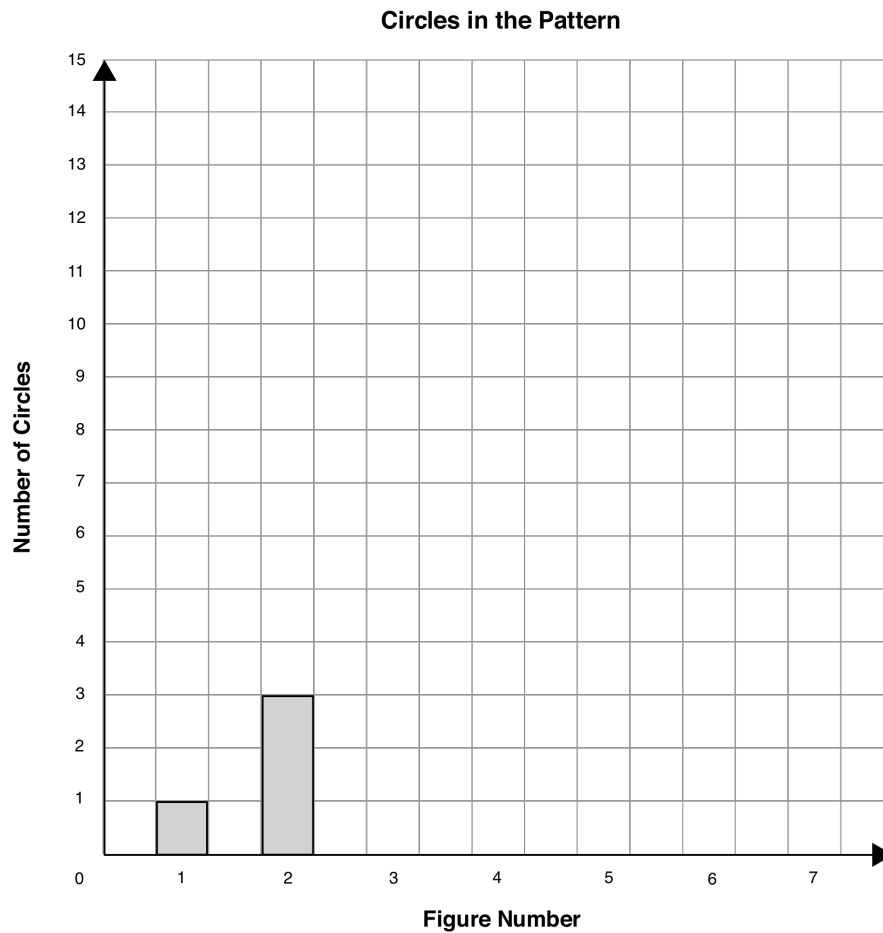
Overall Expectation #1

Spring 2008

7 The first four figures in a pattern are shown below.



Complete the bar graph below to represent the number of circles in each figure.



How many circles will there be in Figure 7?

Explain your thinking.

There will be _____ circles in Figure 7.

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

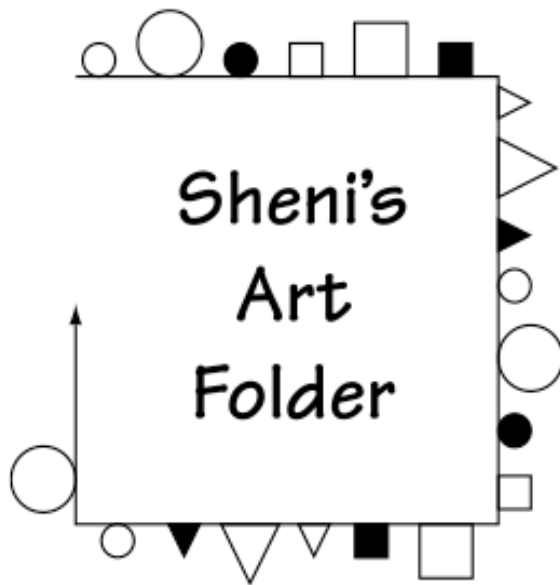
Spring 2009

- 5** An increasing pattern is shown. What are the next four terms in the pattern?

















1, 14, 27, 40, 53, __, __, __, __

- ☐ 66, 79, 92, 105
- ☐ 66, 80, 93, 107
- ☐ 67, 80, 93, 106
- ☐ 67, 82, 96, 111

- 19** Sheni makes a pattern around the edge of her art folder.



What are the next 3 shapes in Sheni's pattern?

- ☐    
- ☐    
- ☐    
- ☐    

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

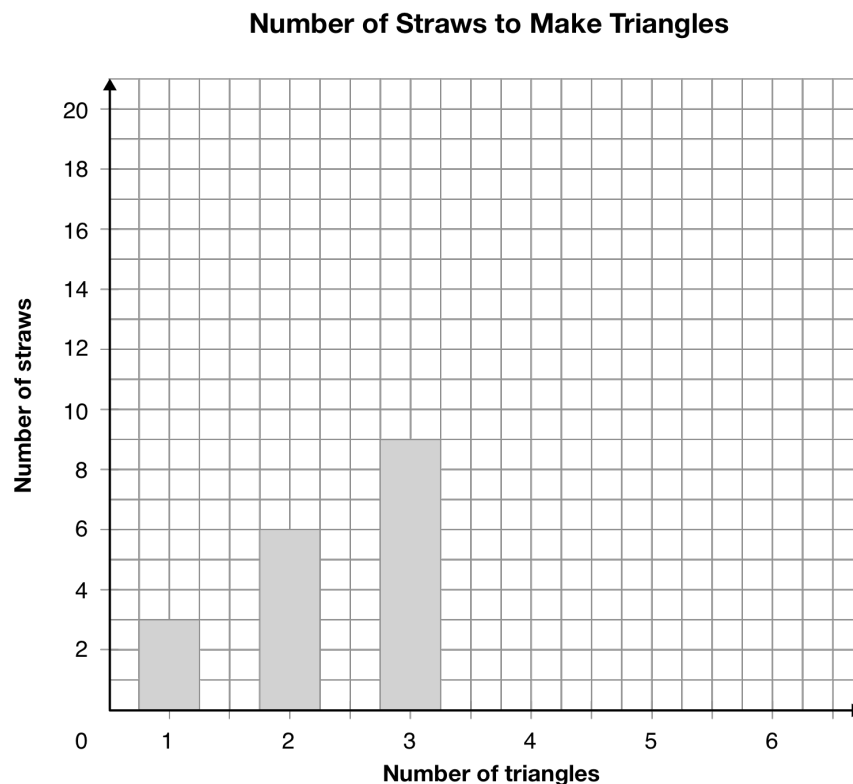
Overall Expectation #1

Spring 2009

- 7** Sally is making triangles using straws.

EQM20094

She creates a bar graph to show how many straws she needs to make triangles.



Complete the graph to show the number of straws for 4, 5 and 6 triangles.

How many straws will Sally need to make 8 triangles?

Justify your answer.

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2010

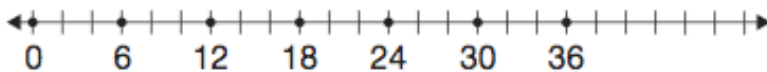
2 Look at the following pattern.

9, 12, 15, 18, ...

If this pattern continues, what will the next three numbers be?

- ☐ 20, 22, 24
- ☐ 20, 23, 26
- ☐ 21, 23, 25
- ☐ 21, 24, 27

32 Look at the pattern marked on the number line below.



Which of the following patterns uses the same pattern rule?

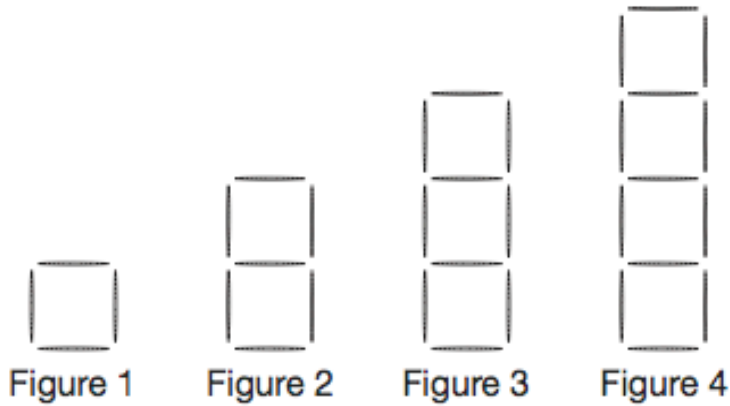
- ☐ 3, 6, 9, 12
- ☐ 3, 9, 15, 21
- ☐ 6, 11, 16, 21
- ☐ 6, 12, 24, 48

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2010

18 Horatio uses toothpicks to create the pattern below.



What number pattern describes the number of toothpicks that Horatio uses?

- ☐ 4, 8, 12, 16
- ☐ 4, 7, 10, 13
- ☐ 1, 4, 7, 10
- ☐ 1, 2, 3, 4

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2010

27 Juanita shades a growing number pattern on the chart below.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

Complete the chart using Juanita's pattern rule.

What is Juanita's pattern rule?

Pattern rule: _____.

Complete the number pattern below using Juanita's pattern rule.

11, __, __, __, __

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2011

1 Gregory creates the pattern shown below.

2, 9, __, 23, 30, 37, __, __, 58

What three numbers are missing from the pattern?

- ☐ 15, 43, 49
- ☐ 15, 44, 51
- ☐ 16, 43, 57
- ☐ 16, 44, 51

13 Which of the following is an example of a repeating pattern?

- ☐ ordering pizza every Wednesday
- ☐ attending the first day of Grade 3
- ☐ going to a basketball game this Friday
- ☐ shopping with your family next Saturday

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2011

17 Look at the shaded number pattern on the chart below.

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Which of the following charts shows a pattern that uses the same rule?



71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2011

19 Look at the pattern below.

5, 9, 13, 17, 21, 25

What is the rule for this pattern?

☐ add 3

☐ add 4

☐ add 5

☐ add 6

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2011

28 Yari wants to collect 83 marbles.

He already has 27 marbles and buys 8 more each week.

How many weeks does it take for Yari to have a total of 83 marbles?

Show your work.

It takes _____ weeks for Yari to have 83 marbles.

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #1

Spring 2011

- 35** Claire creates a growing pattern using pencils.



Shape 1



Shape 2



Shape 3

If the pattern continues in the same way, how many pencils will Claire need to make Shape 4, Shape 5 and Shape 6?

- ☐ 3, 5, 7
- ☐ 4, 5, 6
- ☐ 9, 11, 13
- ☐ 12, 15, 18

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2006

- 7** Chloe wants to solve the number sentence shown.

$$23 - 6 = \square$$

Which of the following number sentences could Chloe use to check her answer?

- ☐ $26 - 3 = 23$
- ☐ $23 + 6 = 29$
- ☐ $17 - 6 = 11$
- ☐ $17 + 6 = 23$ *

- 16** Which addition sentence is related to $16 - 5 = 11$?

- ☐ $16 + 5 = 21$
- ☐ $5 + 11 = 16$ *
- ☐ $6 + 5 = 11$
- ☐ $11 + 16 = 27$

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2006

22 Which number can be placed in the box to make this number sentence true?

$$183 + \square = 200$$

- ☐ 393
- ☐ 383
- ☐ 27
- ☐ 17 *

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2007

1 A number sentence is shown below.

$$83 - \square = 65$$

What number should be placed in the box to make this number sentence true?

- ☐ 151
- ☐ 27
- ☐ 22
- ☐ 18

6 A number sentence is shown below.

$$82 - 17 = 39 + \square$$

Which number should be placed in the box to complete this number sentence correctly?

- ☐ 26
- ☐ 36
- ☐ 65
- ☐ 75

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2007

- 18** The two number sentences below belong to a fact family.

$$7 + 5 = 12$$

$$12 - 5 = 7$$

Which of the following pairs of number sentences belong to the same fact family?

☐ $7 + 12 = 19$
 $17 - 5 = 12$

☐ $12 + 5 = 17$
 $7 - 5 = 2$

☐ $5 + 7 = 12$
 $12 - 7 = 5$

☐ $5 + 7 = 12$
 $7 - 5 = 2$

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2008

3 Which equation below is correct?

- ☐ $8 + 16 = 8 + 4 + 13$
- ☐ $8 + 16 = 8 + 3 + 13$
- ☐ $8 + 16 = 8 + 6 + 13$
- ☐ $8 + 16 = 8 + 7 + 13$

4 What number goes in the box to make the number sentence true?

$$33 - \square = 7$$

- ☐ 22
- ☐ 24
- ☐ 25
- ☐ 26

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2008

20 Wayne is solving the addition problem shown below.

$$16 + 7 = \square$$

He breaks 7 apart into two numbers. He adds one number to 16 to make 20.

What is the other number that needs to be added to 20 to solve the problem?

- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 7

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2009

3 In which box can 6 be placed to make the equation true?

☐ $30 - 4 = 18 + \square$

☐ $30 - 4 = 19 + \square$

☐ $30 - 4 = 20 + \square$

☐ $30 - 4 = 21 + \square$

12 What number correctly completes the number sentence below?

$$\square \times 6 = 6$$

☐ 36

☐ 6

☐ 1

☐ 0

20 Joseph adds $63 + 17$ in his head. Which of the following will give Joseph the same answer?

☐ $60 + 10 + 7$

☐ $60 + 20 + 10$

☐ $60 + 10 + 7 + 3$

☐ $60 + 10 + 10 + 3$

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2009

33 What number can be placed in both boxes to make the following expressions have the same value?

$$\square \times 7$$

$$\square \times 6$$

☐ 7

☐ 6

☐ 1

☐ 0

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2010

5 Which number completes the following number sentence?

$$24 - \square = 17 + 3$$

- ☐ 3
- ☐ 4
- ☐ 6
- ☐ 7

11 Marty solves the following question.

$$65 - 28 = 37$$

Which number sentence would help Marty check his answer?

- ☐ $65 + 28 = 93$
- ☐ $37 - 28 = 9$
- ☐ $93 - 65 = 28$
- ☐ $37 + 28 = 65$

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2010

19 Look at the number sentence below.

$$23 + 18 = \boxed{}$$

Which of the following could be put in the box to make the number sentence true?

- ☐ $20 + 1 + 20$
- ☐ $20 + 3 + 20$
- ☐ $20 + 2 + 20$
- ☐ $20 + 4 + 20$

GRADE THREE EQAO QUESTIONS: Patterning and Algebra

Overall Expectation #2

Spring 2011

- 12** Each row in the table below shows an addition fact and a subtraction fact from the same fact family.

Addition facts	Subtraction facts
$2 + 3 = 5$	$5 - 3 = 2$
?	$13 - 9 = 4$
$4 + 6 = 10$?

Which two facts complete the table?

- ☐ $13 - 4 = 9$ and $6 + 4 = 10$
- ☐ $4 + 9 = 13$ and $10 - 6 = 4$
- ☐ $13 - 4 = 9$ and $10 - 6 = 4$
- ☐ $4 + 9 = 13$ and $6 + 4 = 10$